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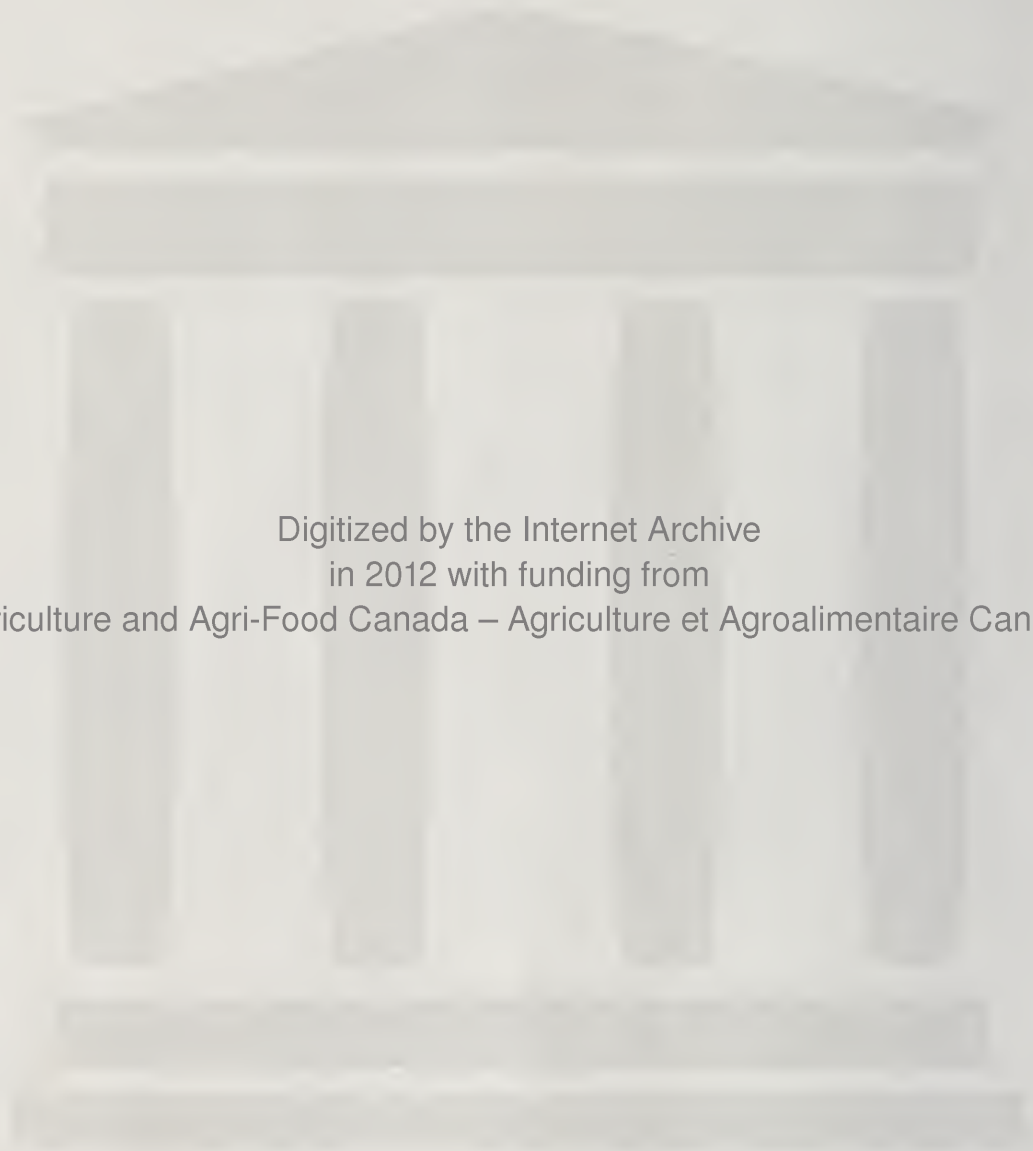

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MIST BEDS
FOR ROOTING CUTTINGS

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Main Needs for Mist Beds

1. Use intermittent mist, outdoors.
2. Choose a sheltered site.
3. Be sure of a good supply of water and electricity.
4. Provide drainage.
5. Mount nozzles upright.
6. To control the misting, install a day-night clock with a minute timer, or an electronic leaf.

MIST BEDS FOR ROOTING CUTTINGS

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In the rooting of softwood cuttings the most important requirement is humidity. One of the best means of providing constant humidity is intermittent mist.

A few years ago continuous misting from fog nozzles came into popular use, but this wasted water and sometimes harmed the cuttings by its leaching action. The system has been improved by adding automatic timing devices and other controlling instruments that reduce water wastage and still meet the needs of the cuttings.

In making a bed for rooting softwood cuttings under intermittent mist, consider the following recommendations.

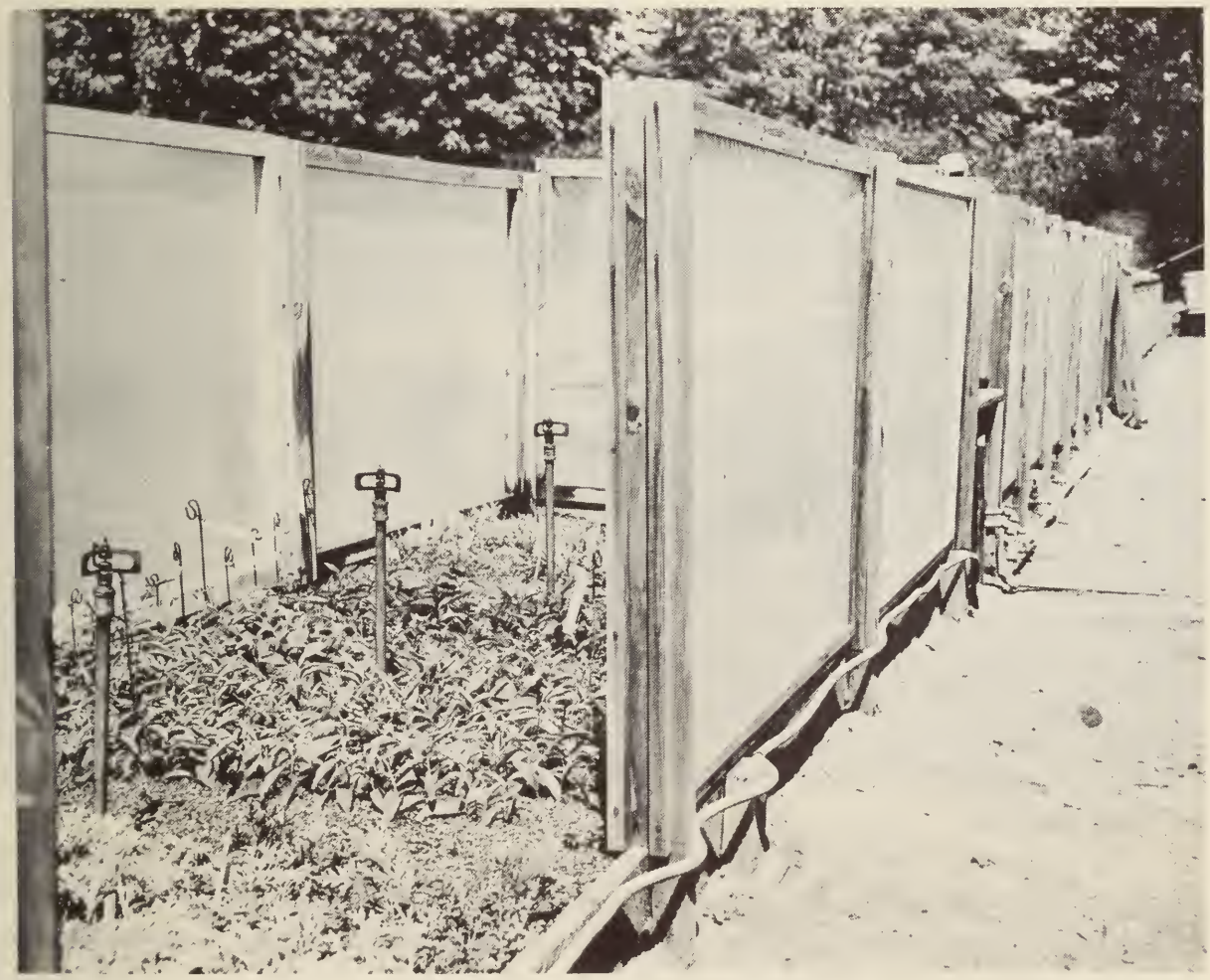

Figure 1.— Open beds for intermittent mist. One panel has been removed to show nozzles and cuttings.

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SITE

Outdoor beds (Figure 1) are best. In general, results in the open have been much better than those in the greenhouse.

Choose a site where water and electricity are readily available. As water under pressure is needed for proper coverage, test the pressure before you consider other requirements. The pressure should be at least 30 pounds. Electricity is needed for operating the controls and the solenoid valve.

Be sure that the location is in full sunlight and shaded as little as possible, even in the morning and evening, and that the beds are protected, at a distance, from prevailing winds. Do not have the beds parallel to the direction of the prevailing wind. To handle the water that seeps through the medium, choose a spot where there is good soil drainage.

CONSTRUCTION OF BEDS

Size

The beds may be of many shapes and sizes. However, if you are making new beds, make them 4 feet wide. This width is the most convenient for sticking cuttings. The length of the beds depends on the number of nozzles that can be operated by a solenoid valve with the water pressure and volume that you have. The greatest length for a bed that can be operated from one solenoid is not known, but at Ottawa a 50-foot bed had uniform coverage. This means that, with city water pressure and 3/8-inch solenoid and pipe, 50 feet is not the greatest possible length.

Drainage

One-inch wooden boards are suitable for the sides of the propagation beds. These boards hold the rooting medium and the drainage material. Other things such as concrete blocks or old railroad crossties are equally satisfactory. To provide good drainage underneath the medium, about 7 inches of crushed stone or gravel is used at the Plant Research Institute. If the drainage at the chosen location is good, dig a pit 7 inches deep and fill it with the coarse material. On the other hand, if drainage is poor place the coarse material on top of the existing soil. The height of the retaining sides depends on the method used.

Rooting Medium

In general, 5 inches of medium is enough for softwood cuttings. Do not use material that will settle under overhead watering. If you use sand, mix as much as one part of granulated peat moss with three of sand to keep the medium friable. In many regions it is almost impossible to get silt-free sand, and crusting may occur unless you add peat moss. For convenience fill the medium to the top of the retaining sides.

Barriers and Side Panels

The mist from the nozzles is very fine. To make sure that all the cuttings are well moistened, you may need barriers or side panels to keep the wind from blowing the spray.

If the site is protected from the prevailing winds and you have several rows of beds, you may need only an unbroken barrier on the windward side. If the site is well protected, a few well-placed barriers, with some open spaces, may be satisfactory. Or an extra mist line on the windward side may be enough.

If you have only one row of beds, however, you need side panels. Removable ones (Figures 2 and 3) are ideal. They allow easy servicing of the bed and, if made to slide up and down, can be raised to provide bottom ventilation and ensure good coverage of the cuttings even with freak winds. Either attach the supporting framework permanently to the bed or, preferably, make it so that it can be moved if you leave the cuttings to grow where they have rooted. Make the barrier 1 to 1½ feet higher than the nozzles. At Ottawa barriers are made of 2-mil polyethylene but many other materials and types of construction can be used.

Figure 2.— Polyethylene tents on outdoor beds.

If you use polyethylene tents (Figure 2) to enclose the beds, cover each bed separately. Build a framework for this tent. For a portable framework, it is ideal to have steel mesh arched over the bed to support the polyethylene.

Although greenhouse beds are not generally used for propagating ornamental softwood cuttings in the summer, they have given promising results in the winter with conifers and some greenhouse crops. In the greenhouse, plastic need only be draped around the beds to keep the mist confined. The supporting framework

may be fairly light. Besides, since drainage in the benches is usually good, only a rather small amount of coarse material is needed under the rooting medium. A few drainage holes will take care of excess water. Do not use any shade during the winter, or rot may be a big problem.

Bottom Heat

Although heating cable is more often used in the greenhouse, it can also be used to advantage outdoors. The lead-covered heating cable is laid just beneath the rooting medium, on top of the drainage material, and a thermostat for the cable is mounted on the panel with the other controls.

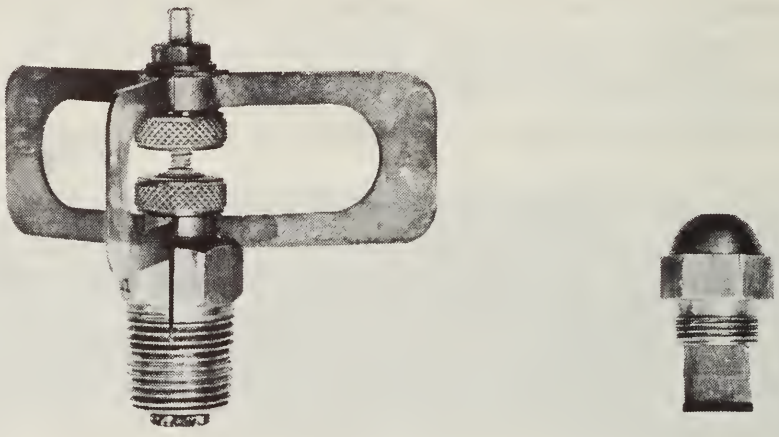

Figure 3.— Mist nozzles generally used: left, baffle type; right, oil-burner type.

NOZZLES AND PIPES

In outdoor beds the oil-burner and baffle types of nozzle (Figure 3) are the most common. The oil-burner nozzle produces a fine spray but it plugs more easily than other types. A self-cleaning oil-burner nozzle is available at higher cost. The baffle type of nozzle produces a somewhat coarse spray but is still very suitable. It rarely clogs and so needs little attention. Furthermore, when mounted upright (see Fig. 4) it sends out a flat, full-coverage mist, which is not disturbed by wind as much as the cone of spray from the oil-burner type similarly mounted.

If you use overhead pipe, leave a space in the bed to allow for drip. When the nozzle is upright it prevents draining and dripping between applications. In addition, the water that remains in the nozzle when it is not on keeps salts from hardening on the nozzle screen. This hardening greatly reduces the effectiveness of the nozzle. It is best, then, to mount the nozzles on 20-inch standards that are connected to a central supply pipe under the medium (Figures 4 and 5). The distance between the nozzles depends on the specifications of the nozzle and the water pressure available. Be sure to study coverage patterns before you decide on the spacing. Galvanized pipe will rust in a few years but it is much

cheaper than copper. When making a choice consider how long you expect to use the installation.

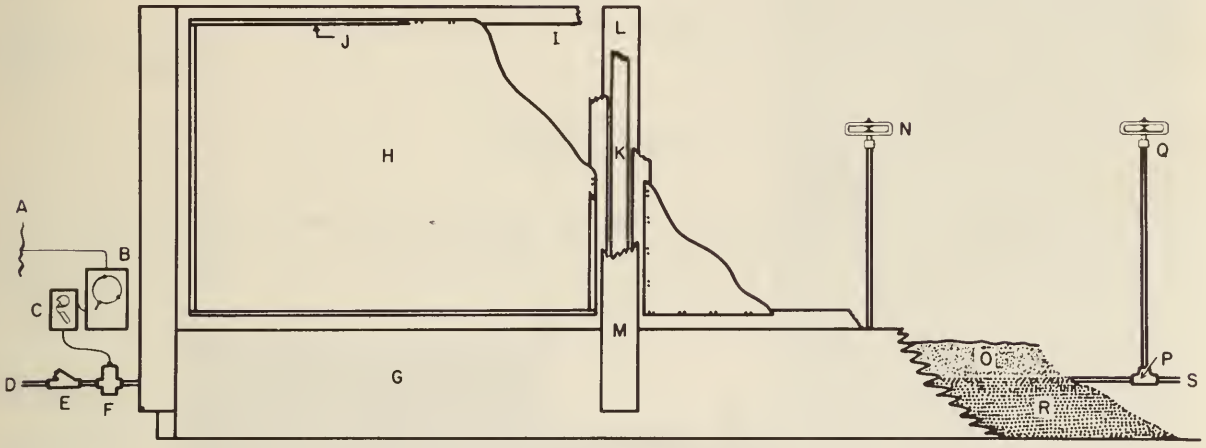

Figure 4.— Diagram of open, outdoor bed.

A. Source of electricity.
B. Day-night clock.
C. Timer to control interval of misting (minute timer shown).
D. Source of water.
E. Strainer in the water line.
F. Solenoid valve.
G. Board, 1 in. by 12 in., to hold the rooting and drainage material.
H. Polyethylene panel.
I. Frame, 1 in. by 2 in. for polyethylene panel.
J. Molding to keep polyethylene in place.
K. Post, 2 in. by 4 in., resting on the frame (G) of the bed.
L,M. Inner and outer boards, 1 in. by 4 in., on two-by-four to keep panel in position.
N. Mist nozzle (baffle type shown).
O. Rooting medium.
P. Tee, 3/8 in.
Q. Buckle, 3/8 in., between the nozzle and the 3/8-inch stand pipe.
R. Drainage material
S. Supply pipe, 3/8 in., under the rooting medium.

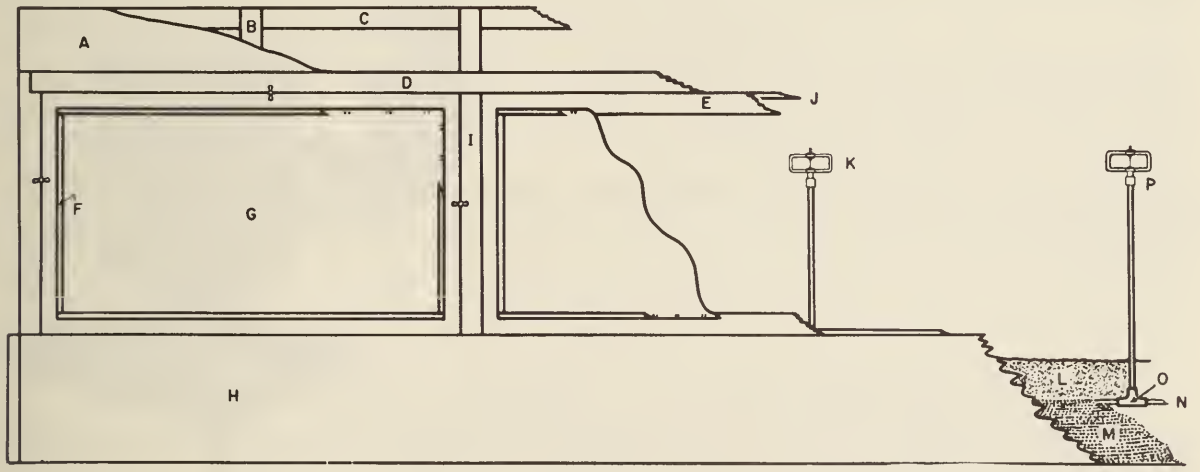

Figure 5.— Diagram of bed with plastic tent.

A. Polyethylene roof.
B. Rafter, 2 in. by 4 in.
C. Ridge, 1 in. by 4 in.
D. Plate, 2 in. by 4 in.
E. Frame, 1 in. by 2 in., for polyethylene panel.
F. Molding to keep polyethylene in place.
G. Polyethylene panel.
H. Board, 1 in. by 12 in., to hold rooting medium and drainage material.
I. Upright, 2 in. by 4 in.
J. Narrow back stop to support panel.
K. Mist nozzle (baffle type shown).
L. Rooting medium.
M. Drainage material.
N. Supply pipe, 3/8 in., under the rooting medium.
O. Tee, 3/8 in.
P. Buckle, 3/8 in., between the nozzle and the stand pipe, 3/8 in.

Note — The controls are not shown but are the same as those in Figure 4.

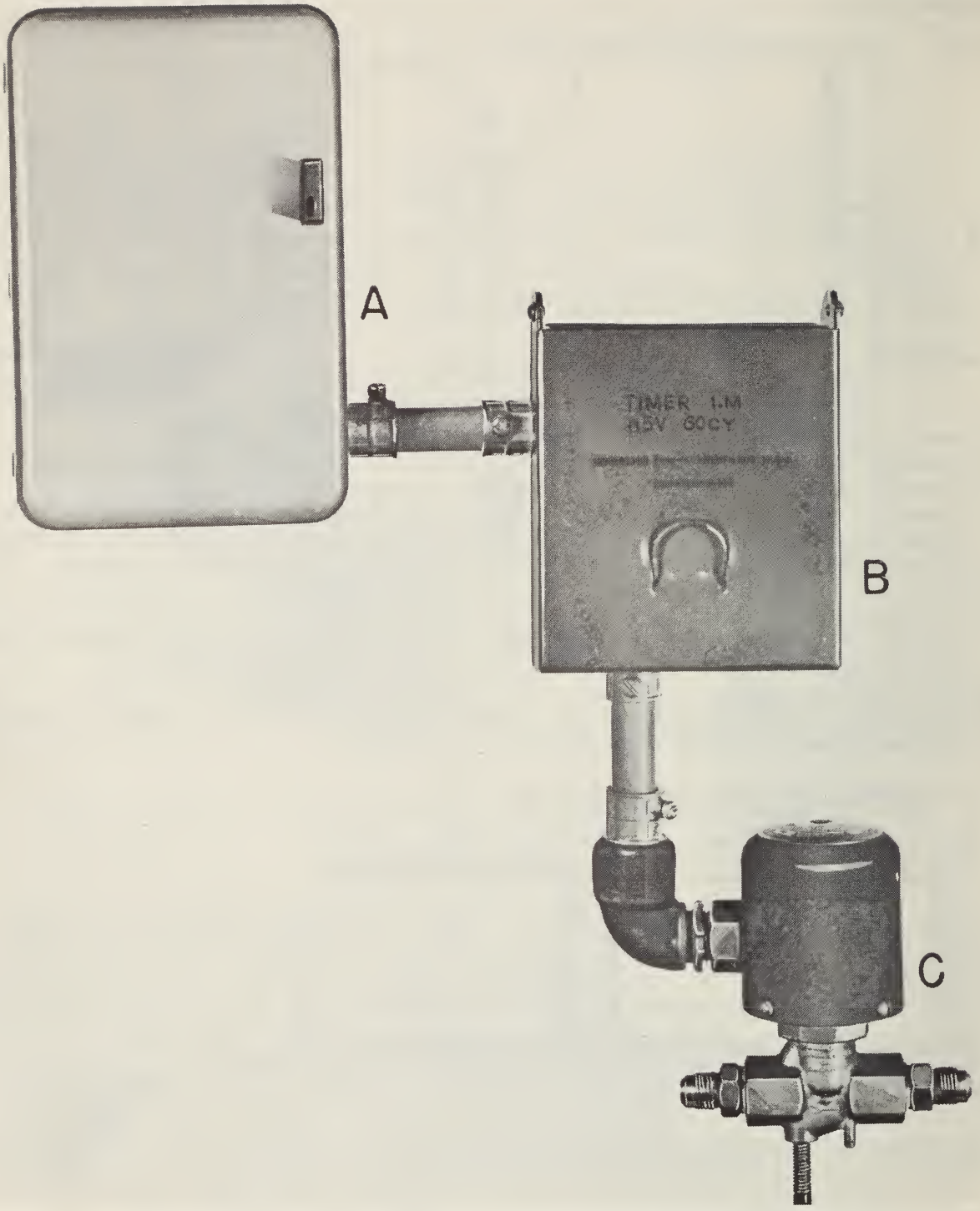

Figure 6.— A set of time clocks attached to a solenoid valve:
A, day-night clock; B, minute timer; C, solenoid valve.

STRAINER AND SOLENOID VALVE

The solenoid valve (Figure 6), a magnetic device, turns the water on and shuts it off. There should be a strainer (Figure 4, E) between this valve and the main supply pipe because without it dirt may get into the valve. If much dirt gets

on the plunger seat the valve will not close and the mist will be continuous. As the nozzle is 3/8 inch in diameter, for small installations use a strainer and solenoid valve the same size as the pipe. For large installations they can be bigger because the size of pipe is reduced at the nozzle and a good supply of water is maintained.

CONTROLS

As the amount of water applied to the cuttings can be varied without harmful results, elaborate controls are not necessary in commercial installations. Most systems have time clocks that are set up just outside the bed.

Day-night Clock

The main control is generally a day-night clock. This has a 24-hour cycle that starts the system operating in the morning at the desired time and shuts it off at a set time in the evening. Except in areas of very drying winds, mist is not needed at night. Expenses can be reduced by doing without this clock and switching the system on and off by hand, but failure to turn the mist on may ruin cuttings.

Timers

The device that governs the solenoid valve and controls the interval of misting has a rather short cycle. One type is a minute timer, which allows mist for part of each minute. The amount of mist is fixed by varying the number of seconds (1½ to 29) of emission. Newer kinds have longer cycles during which mist is applied once or several times for an interval of about 10 seconds. Clocks with a 30-minute cycle are suitable for mist propagation.

Timers with the longer cycles are the better ones for later in the season. Then the mist is gradually reduced so that cuttings will harden off after they have rooted.

The minute timer is still the most satisfactory for a bed with a polyethylene tent because the air temperature in the tent is so high that the cuttings need frequent applications of mist.

Electronic Leaf

Another type of control sometimes used is the electronic leaf (Figure 7). This is a strip of plastic with two electrodes in it. The electric current flows between the electrodes as long as moisture remains on the artificial leaf. When the leaf dries off, the flow is broken; then the solenoid operates and mist shoots out until the film of moisture on the leaf is restored. This control serves very well. However, since the electronic leaf is placed in the mist bed you must examine it often to make sure that salt does not build up on it and cause a short in the circuit.

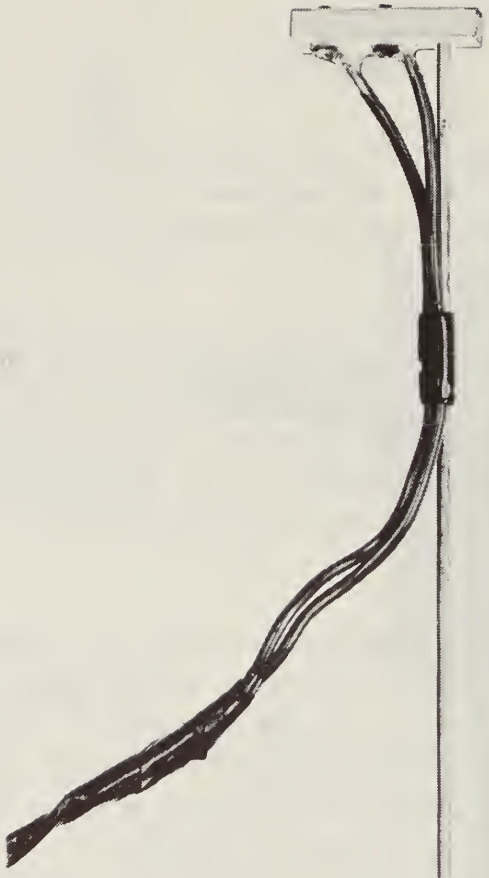

Figure 7.— An electronic leaf control. Leads are attached to a relay switch that operates a solenoid valve.

HANDLING CUTTINGS

Figure 8 illustrates the final steps in preparing the cuttings. Gather the cutting material in polyethylene bags and close the bags tight. Don't leave the bags in direct sunlight after you fill them or the plant material will scorch very quickly. At the Plant Research Institute the tips of the cuttings are evenly arranged and the shoots are cut in a miter box. No attention is given to the position of a node unless internodes are longer than one inch. Leaves from the bottom half of the cutting are stripped off and a bunch of cuttings is treated with hormone if necessary. Actually, under mist only a very small number of the plant materials tested need hormones. If hormones are used the cuttings are treated dry and all excess powder is flicked off. Finally the cuttings are pushed into the friable medium at, for most plants, about 50 per square foot.

Figure 8.— Preparing cuttings for sticking. The cuttings are put in polyethylene bags and brought to the cutting bench. The plant material is arranged with tips even (extreme right). The cuttings are cut with a butcher knife in a miter box (center). Leaves are removed from the bottom halves, the cuttings are dipped in hormone if necessary, and the excess hormone is flicked off with a finger (extreme left).

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